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EXAMINER	
FORMAN, BETTY J	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/497,269	Applicant(s) YU ET AL.	
	Examiner BJ Forman	Art Unit 1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 May 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) *21-25 and 28* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20,26 and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *9* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

FINAL ACTION

1. This action is in response to papers filed 29 May 2002 in Paper No. 8 in which claims 1, 6, 12, 16, 26 and 27 were amended. All of the amendments have been thoroughly reviewed and entered. The previous rejections in the Office Action of Paper No. 7 dated 21 February 2002 under 35 U.S.C. 112, first and second paragraphs are withdrawn in view of the amendments. The previous rejections under 35 U.S.C. 103(a) are maintained. All of the arguments have been thoroughly reviewed and are discussed below. Arguments regarding withdrawn rejections are deemed moot in view of the fact that the rejections are withdrawn.

Currently claims 1-20, 26 and 27 are under prosecution.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-14, 16-20, 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over McAleer et al (U.S. Patent No. 5,708,247, issued 13 January 1998) in view of Mizutani et al (Analytica Chimica Acta, 1998, 364: 173-179) and Backhaus et al (U.S. Patent No. 5,869,001, issued 9 February 1999).

Regarding Claim 1, McAleer et al teach an electrochemical test strip comprising: a reaction zone defined by opposing working and reference electrodes separated by a spacer layer wherein at least one of the electrodes has a surface modified with a homogenous surface

modification layer; and a redox reagent system in said reaction zone, said redox reagent system comprising at least one enzyme and a mediator (Column 2, lines 39-57) but they do not teach the modification layer comprises self assembling molecules having a first sulfhydryl end group and a second sulfonate end group. Mizutani et al teach a similar test strip comprising a reaction zone defined by working and reference electrodes, wherein the working electrode has a surface modified with a homogenous surface modification layer made up of self assembling molecules (page 174, last paragraph); and a redox reagent system present in said reaction zone comprising at least one enzyme and a mediator (page 174, last paragraph-page 175, second paragraph and Fig. 1) wherein the self-assembling molecules have a first sulfhydryl end group and a second carboxylic acid end group where said sulfhydryl and carboxylic acid end groups are separated by a lower alkyl linker group i.e. mercaptopropionic acid (page 178, last two paragraphs)but they do not teach the second end group of the self-assembling molecule is a sulfonate. However, Backhaus et al teach a preferred method for modifying an electrode surface to receive a sample liquid comprises modifying the electrode surface with an alkyl linker group comprising a first sulfhydryl end and a second sulfonate end. Specifically, they teach that alkyl chains terminating at one end with a sulfhydryl group bind especially well to gold electrode surfaces and when terminating at the other end with a sulfonate group (SO_4^{-2}) or carboxyl group (CO_2^{-1}) provide a hydrophilic surface as preferred for receiving a sample liquid (Backhaus et al, Column 7, lines 37-40 and 45-49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify working electrode of McAleer et al by modifying the electrode with mercaptopropionic acid as taught by Mizutani et al to thereby provide a test strip having a rapid response, high sensitivity and high stability for the expected benefit of rapid, sensitive detection over periods of two or more months (Mizutani et al, Abstract). The skilled artisan would have been further motivated to modify the carboxyl group in the mercaptopropionic acid of Mizutani et al by replacing the carboxyl group with a sulfonate group based on the teaching of Backhaus et al wherein a

surface modifier comprising a sulfonate and sulfhydryl is preferred because a hydrophilic is desired for receiving sample liquids (Column 7, lines 38-40) and based on the –2 charge of the sulfonate having increased hydrophilic properties. Therefore, the skilled artisan would have been motivated to apply the sulfonate group (SO_4^{-2}) to the surface modification of Mizutani et al to thereby increase the hydrophilic properties of the surface for the expected benefit increasing interaction with an aqueous sample e.g. body fluid samples as suggested by Backhaus (Column 7, lines 39-40).

Regarding Claim 2, McAleer et al teach the test strip wherein the electrode comprises a metal selected from the group consisting of gold, silver and carbon (Column 3, lines 55-58). Mizutani et al teach the similar test strip wherein the electrode comprises gold (page 174, last paragraph, line 1). Backhaus et al teach the similar test strip wherein the electrode comprises gold (Column 4, lines 29-48)

Regarding Claim 3, McAleer et al teach the test strip wherein the electrode comprises gold (Column 3, lines 55-58). Mizutani et al teach the similar test strip wherein the electrode comprises gold (page 174, last paragraph, line 1). Backhaus et al teach the similar test strip wherein the electrode comprises gold (Column 4, lines 29-48).

Regarding Claim 4, McAleer et al teach the test strip wherein the surface is modified (Column 4, lines 4-26) but they do not teach the surface is modified with HS- $(CH_s)_n$-SO_3Y. Mizutani et al teach the similar method wherein the surface of the working electrode is modified with HS- $(CH_s)_n$-CO_2Y i.e. mercaptopropionic acid (page 174, last paragraph) wherein the mercaptopropionic acid modification layer provided a rapid response with high sensitivity and high stability (page 178, last two paragraphs) but they do not teach the surface is modified with HS- $(CH_s)_n$-SO_3Y. However, Backhaus et al teach a preferred method for modifying an electrode surface to receive a sample liquid comprises modifying the electrode surface with an alkyl linker group comprising a first sulfhydryl end and a second sulfonate end. Specifically, they teach that alkyl chains terminating at one end with a sulfhydryl group bind especially well

to gold electrode surfaces and when terminating at the other end with a sulfonate group (SO_4^{-2}) or carboxyl group (CO_2^{-1}) provide a hydrophilic surface as preferred for receiving a sample liquid (Backhaus et al, Column 7, lines 37-40 and 45-49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify working electrode of McAleer et al by modifying the electrode with mercaptopropionic acid as taught by Mizutani et al to thereby provide a test strip having a rapid response, high sensitivity and high stability for the expected benefit of rapid, sensitive detection over periods of two or more months (Mizutani et al, Abstract). The skilled artisan would have been further motivated to modify the carboxyl group in the mercaptopropionic acid of Mizutani et al by replacing the carboxyl group with a sulfonate group based on the teaching of Backhaus et al wherein a surface modifier comprising a sulfonate and sulfhydryl is preferred because a hydrophilic is desired for receiving sample liquids (Column 7, lines 38-40) and based on the –2 charge of the sulfonate having increased hydrophilic properties. Therefore, the skilled artisan would have been motivated to apply the sulfonate group (SO_4^{-2}) to the surface modification of Mizutani et al to thereby increase the hydrophilic properties of the surface for the expected benefit increasing interaction with an aqueous sample e.g. body fluid samples as suggested by Backhaus (Column 7, lines 39-40).

Regarding Claim 5, McAleer et al teach the test strip wherein at least one enzyme comprises an oxidizing enzyme (Column 2, lines 53-57). Additionally, Mizutani et al teach the similar test strip wherein at least one enzyme comprises an oxidizing enzyme (page, 174, last paragraph-page 175, first paragraph).

Regarding Claim 6, McAleer et al teach an electrochemical test strip comprising: a reaction zone defined by opposing working and reference electrodes separated by a spacer layer wherein at least one of the electrodes has a surface modified with a homogenous surface modification layer; and a redox reagent system in said reaction zone (Column 2, lines 39-57) wherein said redox reagent system comprises enzymes and a mediator (i.e. multiple copies of

the glucose oxidase, Column 4, line 58-Column 5, line 2) but they do not teach the modification layer comprises molecules having formula HS-$(CH_s)_n$-SO_3Y. Mizutani et al teach a similar test strip comprising a reaction zone defined by working and reference electrodes, wherein the working electrode has a surface modified with HS- $(CH_s)_n$-CO_2Y i.e. mercaptopropionic acid (page 174, last paragraph); and a redox reagent system present in said reaction zone comprising enzymes (i.e. multiple copies of the glucose oxidase) and a mediator (page 174, last paragraph-page 175, second paragraph and Fig. 1) wherein the mercaptopropionic acid modification layer provided a rapid response with high sensitivity and high stability (page 178, last two paragraphs) but they do not teach the surface is modified with HS-$(CH_s)_n$-SO_3Y. However, Backhaus et al teach a preferred method for modifying an electrode surface to receive a sample liquid comprises modifying the electrode surface with an alkyl linker group comprising a first sulfhydryl end and a second sulfonate end. Specifically, they teach that alkyl chains terminating at one end with a sulfhydryl group bind especially well to gold electrode surfaces and when terminating at the other end with a sulfonate group (SO_4^{-2}) or carboxyl group (CO_2^{-1}) provide a hydrophilic surface as preferred for receiving a sample liquid (Backhaus et al, Column 7, lines 37-40 and 45-49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify working electrode of McAleer et al by modifying the electrode with mercaptopropionic acid as taught by Mizutani et al to thereby provide a test strip having a rapid response, high sensitivity and high stability for the expected benefit of rapid, sensitive detection over periods of two or more months (Mizutani et al, Abstract). The skilled artisan would have been further motivated to modify the carboxyl group in the mercaptopropionic acid of Mizutani et al by replacing the carboxyl group with a sulfonate group based on the teaching of Backhaus et al wherein a surface modifier comprising a sulfonate and sulfhydryl is preferred because a hydrophilic is desired for receiving sample liquids (Column 7, lines 38-40) and based on the –2 charge of the sulfonate having increased hydrophilic properties. Therefore, the skilled artisan would have

been motivated to apply the sulfonate group (SO_4^{-2}) to the surface modification of Mizutani et al to thereby increase the hydrophilic properties of the surface for the expected benefit increasing interaction with an aqueous sample e.g. body fluid samples as suggested by Backhaus (Column 7, lines 39-40).

Regarding Claim 7, McAleer et al is silent regarding the volume of the reaction zone. Additionally, Mizutani et al is silent regarding the volume of the reaction zone. However, Backhaus et al teach that a sample volume between 0.1 and 10 µl is preferred because analytical methods optimally uses small sample quantities (Column 2, lines 34-38). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the sample volume preferred by Backhaus et al to the reaction zone volume in the methods of McAleer et al and Mizutani et al and to provide reaction zone volumes of between 0.1 and 10 µl because one skilled in the art would have been motivated to minimize reaction zone volumes to thereby minimize sample volumes for the expected benefit of optimizing sample analysis as taught by Backhaus et al.

Regarding Claim 8, McAleer et al teach the test strip wherein the electrode comprises gold (Column 3, lines 55-58). Mizutani et al teach the similar test strip wherein the electrode comprises gold (page 174, last paragraph, line 1). Backhaus et al teach the similar test strip wherein the electrode comprises gold (Column 4, lines 29-48).

Regarding Claim 9, McAleer et al teach the test strip wherein at least one enzyme comprises an oxidizing enzyme (Column 2, lines 53-57). Additionally, Mizutani et al teach the similar test strip wherein at least one enzyme comprises an oxidizing enzyme (page, 174, last paragraph-page 175, first paragraph).

Regarding Claim 10, McAleer et al teach the test strip wherein the oxidizing enzyme is a glucose oxidizing enzyme (Column 2, lines 53-57). Additionally, Mizutani et al teach the similar test strip the oxidizing enzyme is a glucose oxidizing enzyme (page, 174, last paragraph-page 175, first paragraph).

Regarding Claim 11, McAleer et al teach the test strip wherein the surface is modified (Column 4, lines 4-26) but they do not teach the surface is modified with HS-$(CH_s)_n$-SO_3Y. Mizutani et al teach the similar method wherein the surface of the working electrode is modified with HS- $(CH_s)_n$-CO_2Y i.e. mercaptopropionic acid (page 174, last paragraph) wherein the mercaptopropionic acid modification layer provided a rapid response with high sensitivity and high stability (page 178, last two paragraphs) but they do not teach the surface is modified with HS- $(CH_s)_n$-SO_3Y. However, Backhaus et al teach a preferred method for modifying an electrode surface to receive a sample liquid comprises modifying the electrode surface with an alkyl linker group comprising a first sulfhydryl end and a second sulfonate end. Specifically, they teach that alkyl chains terminating at one end with a sulfhydryl group bind especially well to gold electrode surfaces and when terminating at the other end with a sulfonate group (SO_4^{-2}) or carboxyl group (CO_2^{-1}) provide a hydrophilic surface as preferred for receiving a sample liquid (Backhaus et al, Column 7, lines 37-40 and 45-49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify working electrode of McAleer et al by modifying the electrode with mercaptopropionic acid as taught by Mizutani et al to thereby provide a test strip having a rapid response, high sensitivity and high stability for the expected benefit of rapid, sensitive detection over periods of two or more months (Mizutani et al, Abstract). The skilled artisan would have been further motivated to modify the carboxyl group in the mercaptopropionic acid of Mizutani et al by replacing the carboxyl group with a sulfonate group based on the teaching of Backhaus et al wherein a surface modifier comprising a sulfonate and sulfhydryl is preferred because a hydrophilic is desired for receiving sample liquids (Column 7, lines 38-40) and based on the –2 charge of the sulfonate having increased hydrophilic properties. Therefore, the skilled artisan would have been motivated to apply the sulfonate group (SO_4^{-2}) (e.g. 2-mercaptoethane sulfonic acid) to the surface modification of Mizutani et al to thereby increase the hydrophilic properties of the

surface for the expected benefit increasing interaction with an aqueous sample e.g. body fluid samples as suggested by Backhaus (Column 7, lines 39-40).

Regarding Claim 12, McAleer et al teach an electrochemical test strip comprising: a reaction zone defined by opposing working and reference electrodes separated by a spacer layer wherein at least one of the electrodes has a surface modified with a homogenous surface modification layer; and a redox reagent system in said reaction zone (Column 2, lines 39-57) wherein said redox reagent system comprises enzymes and a mediator (i.e. multiple copies of the glucose oxidase, Column 4, line 58-Column 5, line 2) but they do not teach the modification layer comprises 2-mercaptoethane. Mizutani et al teach a similar test strip comprising a reaction zone defined by working and reference electrodes, wherein the working electrode has a surface modified with 3-mercaptopropionic acid (page 174, last paragraph); and a redox reagent system present in said reaction zone comprising enzymes (i.e. multiple copies of the glucose oxidase) and a mediator (page 174, last paragraph-page 175, second paragraph and Fig. 1) wherein the mercaptopropionic acid modification layer provided a rapid response with high sensitivity and high stability (page 178, last two paragraphs) but they do not teach the modification layer comprises 2-mercaptoethane. However, Backhaus et al teach a preferred method for modifying an electrode surface to receive a sample liquid comprises modifying the electrode surface with an alkyl linker group comprising a first sulfhydryl end and a second sulfonate end. Specifically, they teach that alkyl chains terminating at one end with a sulfhydryl group bind especially well to gold electrode surfaces and when terminating at the other end with a sulfonate group (SO_4^{-2}) or carboxyl group (CO_2^{-1}) provide a hydrophilic surface as preferred for receiving a sample liquid (Backhaus et al, Column 7, lines 37-40 and 45-49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify working electrode of McAleer et al by modifying the electrode with mercaptopropionic acid as taught by Mizutani et al to thereby provide a test strip having a rapid response, high sensitivity and high stability for the expected benefit of rapid, sensitive

detection over periods of two or more months (Mizutani et al, Abstract). The skilled artisan would have been further motivated to modify the carboxyl group in the mercaptopropionic acid of Mizutani et al by replacing the carboxyl group with a sulfonate group based on the teaching of Backhaus et al wherein a surface modifier comprising a sulfonate and sulfhydryl is preferred because a hydrophilic is desired for receiving sample liquids (Column 7, lines 38-40) and based on the –2 charge of the sulfonate having increased hydrophilic properties. Therefore, the skilled artisan would have been motivated to apply the sulfonate group (SO_4^{-2}) (e.g. 2-mercaptoethane sulfonic acid) to the surface modification of Mizutani et al to thereby increase the hydrophilic properties of the surface for the expected benefit increasing interaction with an aqueous sample e.g. body fluid samples as suggested by Backhaus (Column 7, lines 39-40).

Regarding Claim 13, McAleer et al is silent regarding the volume of the reaction zone. Additionally, Mizutani et al is silent regarding the volume of the reaction zone. However, Backhaus et al teach that a sample volume between 0.1 and 10 µl is preferred because analytical methods optimally uses small sample quantities (Column 2, lines 34-38). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the sample volume preferred by Backhaus et al to the reaction zone volume in the methods of McAleer et al and Mizutani et al and to provide reaction zone volumes of between 0.1 and 10 µl because one skilled in the art would have been motivated to minimize reaction zone volumes to thereby minimize sample volumes for the expected benefit of optimizing sample analysis as taught by Backhaus et al.

Regarding Claim 14, McAleer et al teach the test strip wherein the electrode comprises gold (Column 3, lines 55-58). Mizutani et al teach the similar test strip wherein the electrode comprises gold (page 174, last paragraph, line 1). Backhaus et al teach the similar test strip wherein the electrode is gold (Column 4, lines 29-43).

Regarding Claim 16, McAleer et al teach a method for determining the concentration of an analyte in a physiological sample comprising: applying the sample to an electrochemical test

strip comprising a reaction zone defined by opposing working and reference electrodes and a redox reagent system; detecting an electrical signal in said reaction zone; and measuring the detected signal to determine the concentration of analyte in the sample (Example 4, Column 6, lines 33-57) but they do not teach but they do not teach one of the electrodes comprises a modification layer comprises self assembling molecules having a first sulfhydryl end group and a second sulfonate end group. Mizutani et al teach a similar method comprising a reaction zone defined by working and reference electrodes, wherein the working electrode has a surface modified with a homogenous surface modification layer made up of self assembling molecules (page 174, last paragraph); and a redox reagent system present in said reaction zone comprising at least one enzyme and a mediator (page 174, last paragraph-page 175, second paragraph and Fig. 1) wherein the self-assembling molecules have a first sulfhydryl end group and a second carboxylic acid end group where said sulfhydryl and carboxylic acid end groups are separated by a lower alkyl linker group i.e. mercaptopropionic acid (page 178, last two paragraphs)but they do not teach the second end group of the self-assembling molecule is a sulfonate. However, Backhaus et al teach a preferred method for modifying an electrode surface to receive a sample liquid comprises modifying the electrode surface with an alkyl linker group comprising a first sulfhydryl end and a second sulfonate end. Specifically, they teach that alkyl chains terminating at one end with a sulfhydryl group bind especially well to gold electrode surfaces and when terminating at the other end with a sulfonate group (SO_4^{-2}) or carboxyl group (CO_2^{-1}) provide a hydrophilic surface as preferred for receiving a sample liquid (Backhaus et al, Column 7, lines 37-40 and 45-49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify working electrode of McAleer et al by modifying the electrode with mercaptopropionic acid as taught by Mizutani et al to thereby provide a test strip having a rapid response, high sensitivity and high stability for the expected benefit of rapid, sensitive detection over periods of two or more months (Mizutani et al, Abstract). The skilled artisan would have been further motivated to

modify the carboxyl group in the mercaptopropionic acid of Mizutani et al by replacing the carboxyl group with a sulfonate group based on the teaching of Backhaus et al wherein a surface modifier comprising a sulfonate and sulfhydryl is preferred because a hydrophilic is desired for receiving sample liquids (Column 7, lines 38-40) and based on the –2 charge of the sulfonate having increased hydrophilic properties. Therefore, the skilled artisan would have been motivated to apply the sulfonate group (SO_4^{-2}) to the surface modification of Mizutani et al to thereby increase the hydrophilic properties of the surface for the expected benefit of more accurate detection of analyte concentration within an aqueous sample e.g. physiological sample as suggested by Backhaus (Column 7, lines 39-40).

Regarding Claim 17, McAleer et al teach the method wherein the surface is modified (Column 4, lines 4-26) but they do not teach the surface is modified with HS- $(CH_s)_n$-SO_3Y. Mizutani et al teach the similar method wherein the surface of the working electrode is modified with HS- $(CH_s)_n$-CO_2Y i.e. mercaptopropionic acid (page 174, last paragraph) wherein the mercaptopropionic acid modification layer provided a rapid response with high sensitivity and high stability (page 178, last two paragraphs) but they do not teach the surface is modified with HS- $(CH_s)_n$-SO_3Y. However, Backhaus et al teach a preferred method for modifying an electrode surface to receive a sample liquid comprises modifying the electrode surface with an alkyl linker group comprising a first sulfhydryl end and a second sulfonate end. Specifically, they teach that alkyl chains terminating at one end with a sulfhydryl group bind especially well to gold electrode surfaces and when terminating at the other end with a sulfonate group (SO_4^{-2}) or carboxyl group (CO_2^{-1}) provide a hydrophilic surface as preferred for receiving a sample liquid (Backhaus et al, Column 7, lines 37-40 and 45-49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify working electrode of McAleer et al by modifying the electrode with mercaptopropionic acid as taught by Mizutani et al to thereby provide a test strip having a rapid response, high sensitivity and high stability for the expected benefit of rapid, sensitive detection over periods of two or more

months (Mizutani et al, Abstract). The skilled artisan would have been further motivated to modify the carboxyl group in the mercaptopropionic acid of Mizutani et al by replacing the carboxyl group with a sulfonate group based on the teaching of Backhaus et al wherein a surface modifier comprising a sulfonate and sulfhydryl is preferred because a hydrophilic is desired for receiving sample liquids (Column 7, lines 38-40) and based on the –2 charge of the sulfonate having increased hydrophilic properties. Therefore, the skilled artisan would have been motivated to apply the sulfonate group (SO_4^{-2}) to the surface modification of Mizutani et al to thereby increase the hydrophilic properties of the surface for the expected benefit of more accurate detection of analyte concentration within an aqueous sample e.g. physiological sample as suggested by Backhaus (Column 7, lines 39-40).

Regarding Claim 18, McAleer et al teach the method wherein the surface is modified (Column 4, lines 4-26) but they do not teach the surface is modified with mercaptoethane sulfonic acid. Mizutani et al teach the similar method wherein the surface of the working electrode is modified with mercaptopropionic acid (page 174, last paragraph) wherein the mercaptopropionic acid modification layer provided a rapid response with high sensitivity and high stability (page 178, last two paragraphs) but they do not teach the surface is modified with mercaptoethane sulfonic acid. However, Backhaus et al teach a preferred method for modifying an electrode surface to receive a sample liquid comprises modifying the electrode surface with an alkyl linker group comprising a first sulfhydryl end and a second sulfonate end. Specifically, they teach that alkyl chains terminating at one end with a sulfhydryl group bind especially well to gold electrode surfaces and when terminating at the other end with a sulfonate group (SO_4^{-2}) or carboxyl group (CO_2^{-1}) provide a hydrophilic surface as preferred for receiving a sample liquid (Backhaus et al, Column 7, lines 37-40 and 45-49). It would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify working electrode of McAleer et al by modifying the electrode with mercaptopropionic acid as taught by Mizutani et al to thereby provide a test strip having a rapid response, high

sensitivity and high stability for the expected benefit of rapid, sensitive detection over periods of two or more months (Mizutani et al, Abstract). The skilled artisan would have been further motivated to modify the carboxyl group in the mercaptopropionic acid of Mizutani et al by replacing the carboxyl group with a sulfonate group based on the teaching of Backhaus et al wherein a surface modifier comprising a sulfonate and sulfhydryl is preferred because a hydrophilic is desired for receiving sample liquids (Column 7, lines 38-40) and based on the –2 charge of the sulfonate having increased hydrophilic properties. Therefore, the skilled artisan would have been motivated to apply the sulfonate group (SO_4^{-2}) (e.g. 2-mercaptoethane sulfonic acid) to the surface modification of Mizutani et al to thereby increase the hydrophilic properties of the surface for the expected benefit of more accurate detection of analyte concentration within an aqueous sample e.g. physiological samples as suggested by Backhaus (Column 7, lines 39-40).

Regarding Claim 19, McAleer et al teach the method wherein the analyte is glucose (Column 2, lines 39-43). Mizutani et al teach the similar method wherein the analyte is glucose (page 177, first and second paragraph and Fig. 3 and 4). Backhaus et al teach the similar method wherein the analyte is glucose (Example 1, Column 10, line 50-Column 11, line 11).

Regarding Claim 20, McAleer et al teach the method wherein the redox reagent system comprises a glucose oxidizing enzyme (Column 2, lines 39-43). Mizutani et al teach the similar method wherein the redox reagent system comprises a glucose oxidizing enzyme (page 175, left column, first paragraph and Fig. 1).

Regarding Claim 26, McAleer et al teach the test strip is present in an automated instrument which is designed to work with test strips i.e. glucose test meter (Column 3, lines 48-53). Mizutani et al also teach the similar test strip is present in an automated instrument i.e. potentiostat (page 175, first full paragraph). Backhaus et al also teach the similar test strip is present in an automated instrument which is designed to work with test strips e.g.

spectrophotometer (Column 6, lines 3-23). The claims are given the broadest reasonable interpretation consistent with the claim language and specification wherein the automate instrument is not defined or described by structural components and/or a structure-function relationship. Therefore, given the broadest reasonable interpretation of the claim, the "automated instrument" encompasses the glucose test meter of McAleer et al; encompasses the potentiostat of Mizutani et al; and encompasses the spectrophotometer of Backhaus et al.

Regarding Claim 27, McAleer et al teach the method wherein detecting and measuring steps are preformed in an automated instrument i.e. glucose test meter (Column 3, lines 48-53). Mizutani et al also teach the similar method wherein detecting and measuring steps are preformed in an automated instrument i.e. potentiostat (page 175, first full paragraph). Backhaus et al also teach the similar method wherein detecting and measuring steps are preformed in an automated instrument e.g. spectrophotometer (Column 6, lines 3-23). The claims are given the broadest reasonable interpretation consistent with the claim language and specification wherein the automate instrument is not defined or described by structural components and/or a function-function relationship. Therefore, given the broadest reasonable interpretation of the claim, the "automated instrument" encompasses the glucose test meter of McAleer et al; encompasses the potentiostat of Mizutani et al; and encompasses the spectrophotometer of Backhaus et al.

Response to Arguments

4 Applicant argues that one skilled in the art would not have been motivated to combine the teachings of McAleer et al, Mizutani et al, and Backhaus et al because McAleer makes no mention of an electrode having a surface modified with a homogenous surface modification layer made up of self assembling molecules having a first sulfhydryl end group and a second sulfonate end groups wherein the end groups are separated by a lower alkyl linker group; Mizutanie et al does not use a redox reagent system comprising at least one enzyme and a mediator; and Backhause et al does not utilize a electrochemical test strip or a redox system. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicant argues that in contrast to Mmizutani et al, the instant invention prevents interfering substances from reaching the electrodes. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., interfering substances being prevented from reaching the electrodes) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant argues that the skilled practitioner in the art would not have been motivated to substitute the carboxylate group of Mizutani et al with the sulfonate moiety of Backhaus et al because, despite the resulting increased hydrophilicity, bonds between sulfonate and amines "often will not form". The argument has been considered but is not found persuasive because Applicant has not provided factual support for the argument. Therefore, the argument is considered an allegation without factual support.

> The arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965); In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997) ("An assertion of what seems to follow from common experience is just attorney argument and not the kind of factual evidence that is required to rebut a prima facie case of obviousness."). See MPEP § 716.01(c) for examples of attorney statements which are not evidence and which must be supported by an appropriate affidavit or declaration (see MPEP 2145 I).

Furthermore, Applicant's statement that "bonds between sulfonate and amines <u>often</u> will not form". Is considered an admission that they sometimes <u>will</u> form.

Applicant argues that even if the skilled artisan were to combine the references, the skilled artisan would not have reasonably predicted the instantly claimed electrode to exhibit a low contact angel measurement, fast wicking time, and storage stability for extended periods of time at elevated temperatures. The argument has been considered but is not found persuasive because the argument does not provide evidence of unexpected results, but is merely based on speculation.

> A showing of unexpected results must be based on evidence, not argument or speculation. In re Mayne, 104 F.3d 1339, 1343-44, 41 USPQ2d 1451, 1455-56 (Fed.

Cir. 1997) (conclusory statements that claimed compound possesses unusually low immune response or unexpected biological activity that is unsupported by comparative data held insufficient to overcome prima facie case of obviousness) (see MPEM 2144.08 B).

Applicant argues that McAleer et al do not describe an electrochemical test strip having opposing working and reference electrodes separated by a spacer as claimed. The argument has been considered but is not found persuasive because, the claimed electrodes are clearly illustrated in Fig. 1 of McAleer et al (see Fig 1 and its description, Column 3, lines 29-39).

5. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over McAleer et al (U.S. Patent No. 5,708,247, issued 13 January 1998) in view of Mizutani et al (Analytica Chimica Acta, 1998, 364: 173-179) and Backhaus et al (U.S. Patent No. 5,869,001, issued 9 February 1999) as applied to claim 12 above, and further in view of Pritchard et al (U.S. Patent No. 5,762,770, issued 9 June 1998)

Regarding Claim 15, McAleer et al teach an electrochemical test strip comprising: a reaction zone defined by opposing working and reference electrodes separated by a spacer layer wherein at least one of the electrodes has a surface modified with a homogenous surface modification layer; and a redox reagent system in said reaction zone (Column 2, lines 39-57) wherein said redox reagent system comprises enzymes and a mediator (i.e. multiple copies of the glucose oxidase, Column 4, line 58-Column 5, line 2) wherein the electrode is gold (Column 3, line 55-58) but they do not teach the electrode is a palladium electrode. Mizutani et al teach a similar test strip (page 174, last paragraph-page 175, second paragraph and Fig. 1) wherein the electrode is gold (page 174, last paragraph) but they do not teach a palladium electrode. However, palladium electrodes were well known in the art at the time the claimed invention was made as taught by Pritchard et al who teach a similar electrochemical test strip. Specifically, Prichard et al teach their similar test strip comprising a reaction zone defined by opposing working and reference electrodes and a redox reagent system comprising at least one

enzyme and a mediator (Column 2, line 64-Column 3, line 15) wherein the preferred working electrode is palladium. They teach palladium is preferred because palladium is difficult to oxidize and because it is an inexpensive noble metal (Column 3, lines 33-36). Therefore, it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to apply the palladium electrode to the electrodes of McAleer et al and Mizutani et al to thereby utilize an inexpensive electrode which resists oxidation in the redox reactions of McAleer et al and Mizutani et al. Specifically, one skilled in the art would have been motivated to utilize a palladium electrode in the redox methods because the electrode resists oxidation and therefore would function over a longer period of time. Therefore, skilled artisan would be further motivated to utilize a palladium electrode in the methods of McAleer et al and Mizutani et al based on lower cost and longer life for the expected benefit of economy of cost and time as taught by Pritchard et al (Column 3, lines 33-36).

Response to Arguments

6. Applicant argues that Pritchard et al does not remedy the deficiencies of McAleer et al, Mizutani et al, and Backhaus et al as discussed above. Therefore, Applicant argues there is no motivation to combine the references or a reasonable expectation of success of arriving at the claimed invention. The argument has been considered but is not found persuasive for the reasons stated above in § 4.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

8. No claim is allowed.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to BJ Forman whose telephone number is (703) 306-5878. The examiner can normally be reached on 6:30 TO 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Jones can be reached on (703) 308-1152. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-4242 for regular communications and (703) 308-8724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0196.

BJ Forman, Ph.D.
Patent Examiner
Art Unit: 1634
August 20, 2002

W. Gary Jones
Supervisory Patent Examiner
Technology Center 1600